UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 3, 2019

Mr. Daniel G. Stoddard
Senior Vice President and
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SUBJECT: MILLSTONE POWER STATION, UNITS 2 AND 3 – SUPPLEMENT TO INTERIM STAFF RESPONSE TO REEVALUATED FLOOD HAZARDS SUBMITTED IN RESPONSE TO 10 CFR 50.54(f) INFORMATION REQUEST – FLOOD-CAUSING MECHANISM REEVALUATION (EPID NOS. L-2015-JLD-0011 AND L-2015-JLD-0012)

Dear Mr. Stoddard:

The purpose of this letter is to provide a summary of the NRC staff's assessment of the storm surge reevaluated flood-causing mechanism and supplement the NRC's December 21, 2016, letter.

By letter dated March 12, 2012 (Agencywide Document Access and Management System (ADAMS) No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.54(f) (hereafter referred to as the 50.54(f) letter). The request was issued as part of implementing lessons learned from the accident at the Fukushima Dai-ichi nuclear power plant. Enclosure 2 to the 50.54(f) letter requested licensees to reevaluate flood-causing mechanisms using present-day methodologies and guidance.

By letter dated December 21, 2016 (ADAMS Accession No.ML16308A226), the NRC staff provided to you a summary assessment of the reevaluated flood-causing mechanisms described in the March 12, 2015, flood hazard reevaluation report (FHRR) submitted by Dominion Nuclear Connecticut, Inc. (Dominion, the licensee) for Millstone Power Station, Units 2 and 3 (MPS2 and MPS3) (ADAMS Accession No. ML15078A203). This letter did not include the staff's conclusions associated with the storm surge flood-causing mechanism, and stated that the staff's evaluation of the probabilistic storm surge analysis was ongoing and that future correspondence documenting the results of the staff's review would follow. By letter dated January 4, 2019 (ADAMS Accession No. ML19011A110), Dominion supplemented the FHRR report with additional information related to the probabilistic storm surge flood hazard.
The NRC staff has reviewed the information submitted by the licensee in its FHRR and January 4, 2019. letter, and has summarized the results of the probabilistic storm surge review in the tables provided as an enclosure to this letter. Table 1 provides the current design-basis flood hazard mechanisms. Table 2 provides the reevaluated flood hazard mechanisms; however, the reevaluated flood hazard mechanisms bounded by the current design basis (Table 1) are not

included. Because of the difference in the licensing basis and the reevaluated hazard elevations for MPS2 and MPS3, there is a Table 1 and Table 2 for each site. The NRC staff also notes that the values for mechanisms in Table 2 considered to be not bounded by the current design basis, other than storm surge, remain unchanged from the NRC's December 21, 2016, letter.

As stated in its December 21, 2016, letter, the licensee submitted both deterministic and probabilistic storm surge analyses in its FHRR, but proposed using its results for the probabilistic storm surge analysis as an input for the additional assessments. The NRC staff agreed with this approach. The NRC staff reviewed the storm surge analysis and notes that the storm surge values reflected in Table 2 of this letter are representative of an annual exceedance probability that supports decision-making, which is typically 10^{-3} (with margin) to 10^{-4}. This approach is consistent the performance of an integrated assessment as described in Nuclear Energy Institute (NEI) 16-05, Revision 1, "External Flooding Assessment Guidelines" (ADAMS Accession No. ML16165A178). Guidance document NEI 16-05, Revision 1, has been endorsed by Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) JLD-ISG-2016-01, "Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flood Hazard Reevaluation" (ADAMS Accession No. ML16162A301). The application of the storm surge values presented in Table 2 for methods other than those described in JLD-ISG-2016-01 should be closely coordinated with the NRC staff to ensure adequate communication.

In order to complete its response to the information requested by Enclosure 2 to the 50.54(f) letter, the licensee is expected to submit an integrated assessment or a focused evaluation, as appropriate, to address the reevaluated flood hazards that exceed the current design basis, as described in the NRC letter dated September 1, 2015, "Coordination of Request for Information Regarding Flooding Hazard Reevaluation and Mitigating Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML15174A257). This letter describes the changes in the NRC's approach to the flood hazard reevaluations that were approved by the Commission in its Staff Requirements Memorandum to COMSECY-15-0019, "Closure Plan for the Reevaluation of Flooding Hazards for Operating Nuclear Power Plants" (ADAMS Accession No. ML15209A682).

Further, the NRC staff has concluded that the licensee's reevaluated flood hazard information reflected in Table 2 is a suitable input for the remaining flooding assessments associated with the 50.54(f) letter. The NRC staff issued a staff assessment by letter dated October 3, 2018 (ADAMS Accession No. ML18256A200), that provides the documentation supporting the NRC staff's conclusions summarized in the December 21, 2016, letter, and plans to issue a staff assessment documenting the basis for the storm surge conclusions at a later time.

If you have any questions, please contact me at (301) 415-3809 or e-mail at Juan.Uribe@nrc.gov.

Sincerely,

Juan Uribe, Project Manager
Beyond-Design-Basis Management Branch
Division
Office of Nuclear Reactor Regulation

Docket Nos. 50-336 and 50-423

Enclosure:
Summary of Results of Flooding
Hazard Re-Evaluation Report

cc w/encl: Distribution via Listserv

Millstone Power Station, Unit 2

Table 1. Current Design Basis Flood Hazards[1]

Mechanism	Stillwater Elevation	Waves/Runup	Design Basis Flood Hazard Elevation	Reference
Local Intense Precipitation	14.5 feet (ft.) Mean sea level (MSL)	Minimal	14.5 ft. MSL	FHRR Table 1.2-1
Streams and Rivers	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Section 1.2-1
Failure of Dams and Onsite Water Control/Storage Structures	Not Included in DB	Not Included in DB	Not Included in DB	FHRR Sections 2.3.3 and 3.3
Storm Surge				
Storm Surge (standing wave) within the Intake Structure for Unit 2	26.5 ft. MSL	NA	26.5 ft. MSL	FHRR Sections 3.4 and 3.9. FHRR Table 3.0-1. Updated from Interim Staff Response (ISR) letter ML16308A234. See FHRR supplement ML19011A110, Att. A Table 6
Storm Surge at the Unit 2 Powerblock	18.2 ft. MSL	6.9 ft.	25.1 ft. MSL	FHRR Sections 3.4 and 3.9. FHRR Table 3.0-1. Updated from ISR letter ML16308A234. See FHRR supplement ML19011A110, Att. A Table 6

[1] In the December 21, 2016, ISR letter (ML16308A234), the staff presented elevations in National Geodetic Vertical Datum of 1929 (NGVD29) datum. For this ISR table, which includes storm surge, the staff is using MSL to be consistent with previous licensee submittals which equated MSL with NGVD29. As a result, no numeric values previously presented in this set of tables for Units 2 and 3 were affected by this datum change.

Seiche	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Table 1.2-1
Tsunami	Not included in DB	Not included in DB	Not included in DB	FHRR Table 1.2-1
Ice-Induced Flooding	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Table 1.2-1
Channel Migrations/Diversion	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Table 1.2-1

Millstone Power Station, Unit 2

Table 2. Reevaluated Flood Hazards for Flood-Causing Mechanisms

Mechanism	Stillwater Elevation	Waves/Runup	Reevaluated Hazard Elevation	Reference
Local Intense Precipitation	17.5 ft. MSL	Minimal	17.5 ft. MSL	FHRR Section 3.1
Streams and Rivers	11.2 ft. MSL	Not applicable	11.2 ft. MSL	FHRR Section 2.2
Storm Surge				
Storm Surge (standing wave) within the Intake Structure for Unit 2	16.9[2] ft. MSL	NA	27.56 ft. MSL[3]	Updated from ISR letter ML16308A234. See calculation package NAI-1996-001 referenced by FHRR supplement ML19011A110.
Storm Surge at the Unit 2 Powerblock	17.5 ft. MSL	Negligible at east side of MPS 2. 2.3 ft. at west side of MPS2.	17.5 ft. MSL at east side of MPS2 19.8 ft. MSL at west side of MPS2	Updated from ISR letter ML16308A234. See FHRR supplement ML19011A110, Att. A, Table 6.
Tsunami	14.7 ft. MSL	Not applicable	14.7 ft. MSL	FHRR Section 2.6

[2] External reevaluated water levels at the Unit 2 intake structure were reported as 16.9 ft. for stillwater and 37.2 ft. for the external total water level (including wave runup of 20.3 ft.). However, the CDB is for service water pumps within the Unit 2 intake structure.

[3] This reported value is the maximum water level from 4 cases evaluated for Unit 2 internal water levels using the GOTHIC code as presented in calculation package NAI-1996-001, which is referenced as "Zachry, 2018c" in the supplement to the FHRR. Based on a high-level review, staff found the use of the GOTHIC code, model development and water level and wave inputs reasonable. While the review of NAI-1996-001 did not include verification of elevations, areas and volumes included in the model, staff recognize that the licensee's documentation indicates these inputs were verified in accordance with a quality assurance plan that conforms to 10CFR50, Appendix B.

Millstone Power Station, Unit 3

Table 1. Current Design Basis Flood Hazards

Mechanism	Stillwater Elevation	Waves/Runup	Design Basis Flood Hazard Elevation	Reference
Local Intense Precipitation				
RWST/SIL Enclosure	24.9 ft. MSL	Minimal	24.9 ft. MSL	FHRR Table 1.2-3 and Table 3.0-3
Demineralized Water Storage Tank Block House	24.9 ft. MSL	Minimal	24.9 ft. MSL	FHRR Table 1.2-3
Fuel Building	24.9 ft. MSL	Minimal		FHRR Table 1.2-3
Auxiliary Building Door A-24-6	24.9 ft. MSL	Minimal	24.9 ft. MSL	FHRR Table 3.0-3
Engineered Safety Features Building	24.9 ft. MSL	Minimal	24.9 ft. MSL	FHRR Table 1.2-3
Hydrogen Recombiner Building	24.9 ft. MSL	Minimal	24.9 ft. MSL	FHRR Table 1.2-3
Main Steam Valve Building	24.9 ft. MSL	Minimal		FHRR Table 1.2-3
Emergency Generator Enclosure	24.3 ft. MSL	Minimal	24.9 ft. MSL	FHRR Table 1.2-3
Auxiliary Building Door A-24-1	24.9 ft. MSL	Minimal	24.9 ft. MSL	FHRR Table 3.0-3
Control Building	24.3 ft. MSL	Minimal	24.3 ft .MSL 24.9 ft. MSL 24.3 ft. MSL	FHRR Table 1.2-2

Streams and Rivers	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Section 1.2-2
Failure of Dams and Onsite Water Control/Storage Structures	Not Included in DB	Not Included in DB	Not Included in DB	FHRR Sections 2.3.3 and 3.3
Storm Surge				
Storm Surge at Seaward Wall of Intake Structure for Unit 3	19.7 ft. MSL	21.5 ft.	41.2 ft. MSL	FHRR Section 3.9 and Table 3.0-2. Updated from ISR letter ML16308A234. See FHRR supplement ML19011A110, Att. A Table 7
Storm Surge at the Unit 3 Powerblock	19.7 ft. MSL	4.1 ft.	23.8 ft. MSL	FHRR Sections 1.5 and 3.9. FHRR Tables 1.2-2 and 3.0-2. Updated from ISR letter ML16308A234. See FHRR supplement ML19011A110, Att. A Table 7.
Seiche	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Table 1.2-2
Tsunami	Not included in DB	Not included in DB	Not included in DB	FHRR Table 1.2-2
Ice-Induced Flooding	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Table 1.2-2
Channel Migrations/Diversion	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Table 1.2-2

Millstone Power Station, Unit 3

Table 2. Reevaluated Flood Hazards for Flood-Causing Mechanisms

Mechanism	Stillwater Elevation	Waves/Runup	Reevaluated Hazard Elevation	Reference
Streams and Rivers	11.2 ft. MSL	Not applicable	11.2 ft. MSL	FHRR Section 2.2
Storm Surge				
Storm Surge at Seaward Wall of Intake Structure for Unit 3	17.1 ft. MSL	25.5 ft.	42.6 ft. MSL	Updated from ISR letter ML16308A234. See FHRR supplement ML19011A110, Att. A Table 7
Storm Surge at the Unit 3 Powerblock	17.7 ft. MSL	4.5 ft.	22.2 ft. MSL[4]	Updated from ISR letter ML16308A234. See FHRR supplement ML19011A110, Att. A Table 7.
Tsunami	14.7 ft. MSL	Not applicable	14.7 ft. MSL	FHRR Section 2.6

[4] The reevaluated total water level for the Unit 3 powerblock is below the site grade of 24 ft. MSL.

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ADAMS Accession No.: ML19070A217 ***via email**

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